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EUROPEAN PATENT APPLICATION

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(71) Applicant: Terayon Communication Systems, Inc.
Santa Clara, CA 95054 (US)

(72) Inventors:
• Rakib, Selim Shlomo, Dr.
Cupertino, California 95014 (US)
• Azenkot, Yehuda
San Jose, California 95129 (US)

(74) Representative: Brax, Matti Juhani
Berggren Oy Ab,
P.O. Box 16
00101 Helsinki (FI)

(54) Apparatus and method for digital data transmission

(57) A method and apparatus for carrying out synchronous co-division multiple access (SCDMA) communication of multiple channels of digital data over a shared transmission media (1162). The system includes modems at remote units (1164) and a central unit (1160) to receive time division multiplexed digital data arranged into timeslots or channels and uses orthogonal codes to encode each channel of multiple data and spread the

energy of each channel data over a frame of data transmitted in a code domain. Frames are synchronized as between remote (1164) and central units (1160) using a ranging scheme which is also useful in any other system transmitting data by frames in a distributed system where synchronizing the frames as between all units regardless of differences in propagation delays is necessary. Each frame in the SCDMA modulation scheme includes a gap or guardband containing no other data.

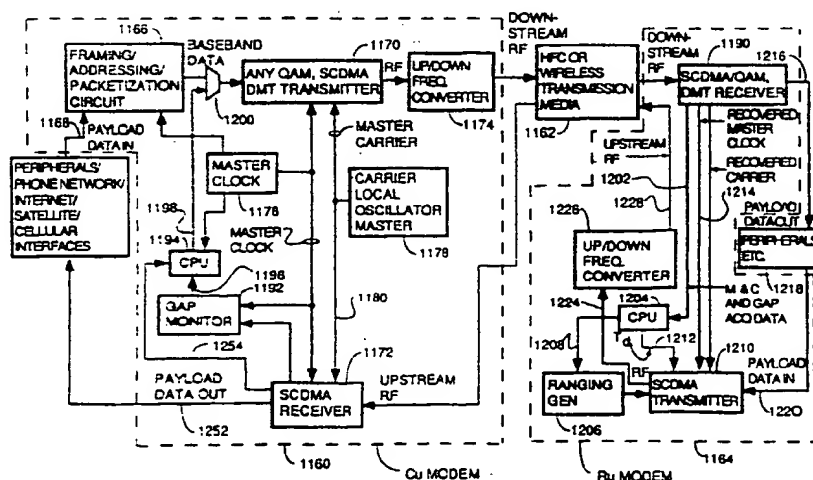


FIG. 49

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EUROPEAN SEARCH REPORT

Application Number
EP 01 10 4541

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (InCL6)
A	JOHANSSON A -L ET AL: "SUCCESSIVE INTERFERENCE CANCELLATION IN MULTIPLE DATA RATE DS/CDMA SYSTEMS" PROCEEDINGS OF THE VEHICULAR TECHNOLOGY CONFERENCE, US, NEW YORK, IEEE, vol. CONF. 45, 25 July 1995 (1995-07-25), pages 704-708, XP000551625 ISBN: 0-7803-2743-8 * abstract * * parts I, II and III *	1-40	H04N7/173 H04L12/28 H04J11/00 H04J13/02 H04J3/06 H04B1/707 H04L5/02 H04L27/38
A	AKIHIRO KAJIWARA ET AL: "SPREAD SPECTRUM DEMODULATOR USING BLOCK SIGNAL PROCESSING" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON COMMUNICATIONS, US, NEW YORK, IEEE, vol. -, 23 June 1991 (1991-06-23), pages 894-898, XP000269616 ISBN: 0-7803-0006-8 * abstract * * parts 1. and 2. *	1-40	
A	NEE VAN R D J: "TIMING ASPECTS OF SYNCHRONOUS CDMA" IEEE INTERNATIONAL SYMPOSIUM ON PERSONAL, INDOOR AND MOBILE RADIO COMMUNICATIONS, 1994, pages 439-443, XP000619815 * page 439 - page 440 *	41-55	TECHNICAL FIELDS SEARCHED (InCL6) H04J H04B H04L
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 December 2001	Examiner Chauvet, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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INVENTOR: KORA38 KAE3831

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet 8

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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EUROPEAN SEARCH REPORT

Application Number
EP 01 10 4541

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 8)
A	KAZAMA H. ET AL.: "SEMI-AUTONOMOUS SYNCHRONIZATION AMONG BASE STATIONS FOR TDMA-TDD COMMUNICATIONS SYSTEMS" IEICE TRANSACTIONS ON COMMUNICATIONS, INSTITUTE OF ELECTRONICS INFORMATION AND COMM. ENG. TOKYO, JP, vol. E77-B, no. 7, 1 July 1994 (1994-07-01), pages 862-866, XP000471316 ISSN: 0916-8516 * page 862 - page 864, column 2, line 4 *	41-55	
A	US 5 229 996 A (BAECKSTROEM TOMAS ET AL.) 20 July 1993 (1993-07-20) * abstract *	41-55	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 8)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 December 2001	Examiner Chauvet, C
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : documents cited for other reasons & : member of the same patent family, corresponding document</p>			

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LACK OF UNITY OF INVENTION
SHEET B

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-40

Remote unit modem to transmit digital data upstream to a headend modem or method of transmitting digital data upstream to a headend modem

2. Claims: 41-55

Remote unit modem to transmit digital data upstream to a headend modem or process of bidirectional digital data communication carried out by remote unit modem to exchange digital data transmissions with a headend modem

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP: 01 10 4541

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

03-12-2001

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		GB 2254226 A	30-09-1992
		JP 3088819 B2	18-09-2000
		JP 5068002 A	19-03-1993
		KR 226125 B1	15-10-1999
		SE 9200575 A	29-08-1992

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82 -

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